that forms a portion of the voltage divider network, the voltage sensing means being connected for measuring the voltage appearing across that portion of the voltage divider network provided by said input capacitance and for providing a voltage output that corresponds to the strength of said electrical potential difference

characterized in that the capacitance that can exist between the source surface and the voltage sensing means is sufficient so that, when the pickup electrode is placed adjacent the source surface, the change in the capacitive coupling between the voltage sensing means and the source surface arising from a change in the separation distance between the pickup electrode and said surface varies insensitively with displacement of the electrode towards or away from the surface whereby, upon variation of the separation distance between the source surface and the pick-up electrode, the overall, effective capacitance formed in use between said source surface and the voltage sensing means through the pick-up electrode is such that the change in capacitance is no greater than 50 percent when subjected to a 0.1 mm increase in said separation distance.

A1 cont. new matter

23. A sensor as in claim ~~1~~ 22 wherein the voltage output of the voltage sensing means is an unmodulated voltage output that corresponds to the strength of said electrical potential difference.

24. A sensor as in claim ~~1~~ 22 wherein the percentage change in capacitance is less than 20% when a 0.1 mm increase in the separation distance occurs.

25. A sensor as in claim ~~1~~ 22 wherein said insulating layer is of such dimensions as to preclude the electrode from providing a capacitance value of over 40 picoFarads/cm^2.

26. A sensor as in claim ~~1~~ 22 wherein said insulating layer is of such dimensions as to preclude the electrode from providing a capacitance value of over 20 $picoFarads/cm^2$.

27. A sensor as in claim ~~1~~ 22 wherein said insulating layer is of such dimensions as to preclude the electrode from providing a capacitance value of over 10 $picoFarads/cm^2$.

28. A sensor as in claim ~~1~~ 22 comprising a series capacitor, positioned within said voltage divider network between said pickup electrode and the voltage sensing means, said series capacitor having a value in picoFarads of less than five times the area of the pick-up electrode in cm^2.

A1 cont.

29. A sensor as in claim ~~7~~ 28 wherein said series capacitor has a value of between 5 and 40 picoFarads.

30. A sensor as in claim ~~1~~ 22 comprising a leakage resistor in parallel with the input capacitance of the voltage sensing means of between 10^{11} and 10^{13} ohms.

31. A sensor as in claim ~~1~~ 22 comprising a capacitive coupling for connection to the source surface at the end of the voltage divider network opposite the pick-up electrode.

32. A sensor as in claim ~~1~~ 22 comprising a resistive-contact coupling for connection to the source surface at the end of the voltage divider network opposite the pick-up electrode, said resistive contact coupling having a resistance value of 500 k ohms, or less.

33. A sensor as in claim ~~1~~ 22 having a conductive element positioned over the insulating layer on the externally-directed side of the face surface of the pick-up electrode to reduce the effects of externally generated electrical noise.

34. A sensor assembly system comprising two sensors as in claim ~~1~~ 22 to be applied at a spaced separation over the source surface, said two pick-up sensors being connected to a differential amplifier to obtain the difference in the output signals from two locations on the surface with common mode noise rejection.

112

35. A sensor assembly comprising multiple sensors each as in claim ~~1~~ 22 assembled on a carrier to locate the pick-up electrodes of each sensor in a fixed, preformated array.

A1 cont.

36. A sensor assembly as in claim ~~14~~ 35 wherein the carrier is a piece of clothing that can be readily donned or removed with minimal inconvenience.

37. A sensor assembly as in claim ~~14~~ 35 combined with tele-monitoring means.

Sub B2

~~38. A method of sensing an electrical potential difference present over a surface comprising:~~

~~(1) presenting a pickup electrode to confront said surface and to establish a capacitive coupling to said surface and receive a signal based upon the electric field emanating therefrom;~~

~~(2) applying the signal so received to a voltage divider network which includes at one end the pick-up electrode and at another end an electrical coupling means connected to another portion of the surface over which an electrical potential difference exists, there being a high impedance amplifier with an input capacitance connected in series within said voltage divider network;~~

~~(3) maintaining the pickup electrode at a spaced separation from the confronted, field-emanating surface so that~~

the overall effective capacitance between said surface and said amplifier has a value in the region of a plot of capacitance value versus separation distance wherein the percentage change in capacitance is no greater than 50 percent when subjected to a 0.1 mm increase in the separation distance occurring between the pick-up electrode and the confronted surface

whereby a signal is provided to the amplifier to provide an amplifier output voltage that corresponds to the strength of said electrical potential difference, and wherein the capacitive coupling between the field-emanating surface and the amplifier through the pickup electrode varies insensitively with displacement of the electrode away from said surface.

A1 cont.

39. A method as in claim ~~17~~ 38 wherein the percentage change in the capacitance is less than 20% when a 0.1 mm increase in the separation distance occurs.

40. A method as in claim ~~17~~ 38 wherein the pickup electrode has a surface confronting face that is provided with an insulative dielectric layer having a thickness such as to preclude the electrode from providing a capacitance value of over 40 picoFarads per centimeter squared.

41. A method as in claim ~~17~~ 38 wherein the voltage divider network includes a series limiting capacitor between the pickup electrode and the input to the amplifier, the pickup electrode having a value of between 5 and 40 picoFarads.